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Molecular Clouds as Cosmic Ray Laboratories

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The advent of high sensitivity, high resolution gamma-ray detectors, together with a knowledge of the distribution of the atomic hydrogen and especially of the molecular hydrogen in the Galaxy on sub-degree scales creates a unique opportunity to explore the flux of cosmic rays in the Galaxy. We here present a methodology which aims to provide a test bed for current and future gamma-ray observatories to explore the cosmic ray flux at various positions in our Galaxy. Also, using model predictions for cosmic rays escaping supernova remnants we present the GeV to TeV gamma-ray emission produced by the collisions of runaway cosmic rays with the gas in the environment surrounding the shell-type supernova remnant RX-J1713.7-3946.

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